

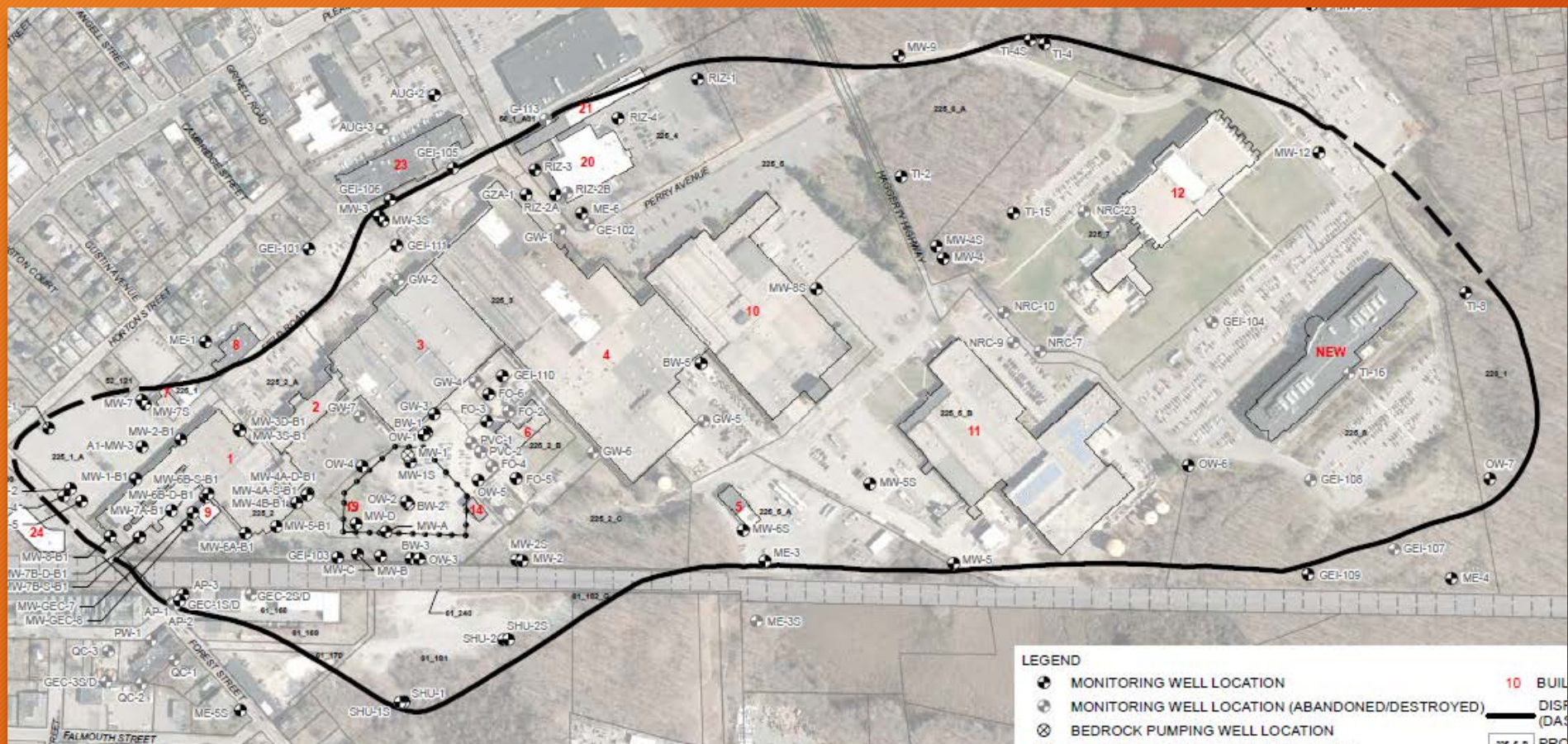
Texas Instruments, Attleboro, MA NPDES Permit

June 2020 conference call with EPA

1. Overview of MCP Site
2. Overview of NPDES Permit
3. Summary of TCE Exceedances and Responses
4. On-going and Planned Evaluations to Improve System

1.) Massachusetts Contingency Plan (MCP) Site Overview

- MassDEP MCP RTN 4-0022; currently has a Temporary Solution
- Since 1986, a groundwater extraction system located south of Building 3 has operated to recover contaminated groundwater for treatment.
- In 2013 a new treatment system was constructed to replace the original treatment system, and the recovery system was expanded to include collection and treatment of dry weather flow (seepage of groundwater into the subsurface storm drain system).



Site Plan - MCP Site

MCP Site Overview (continued)

- 6-month Temporary Solution Status Reports are submitted to MassDEP per MCP. Every 5 years, a review of the Temporary Solution is completed per the MCP.
- On-going MCP assessment continuing at parts of the site with reporting to MassDEP.
- Site property is no longer owned or occupied by TI and TI is considered a former owner and operator. In 2005, Preferred Real Estate Investments, Inc. (PREI), the entity that purchased the property from TI, submitted an application to the Massachusetts Attorney General's Office for protection from MCP liability under the Brownfields Covenant-not-to-Sue program. The property that makes up the site is currently owned by various entities, and PREI no longer owns any of the property.

2.) Overview of NPDES Permit and History

Outfalls in MA0001791(1986-present)

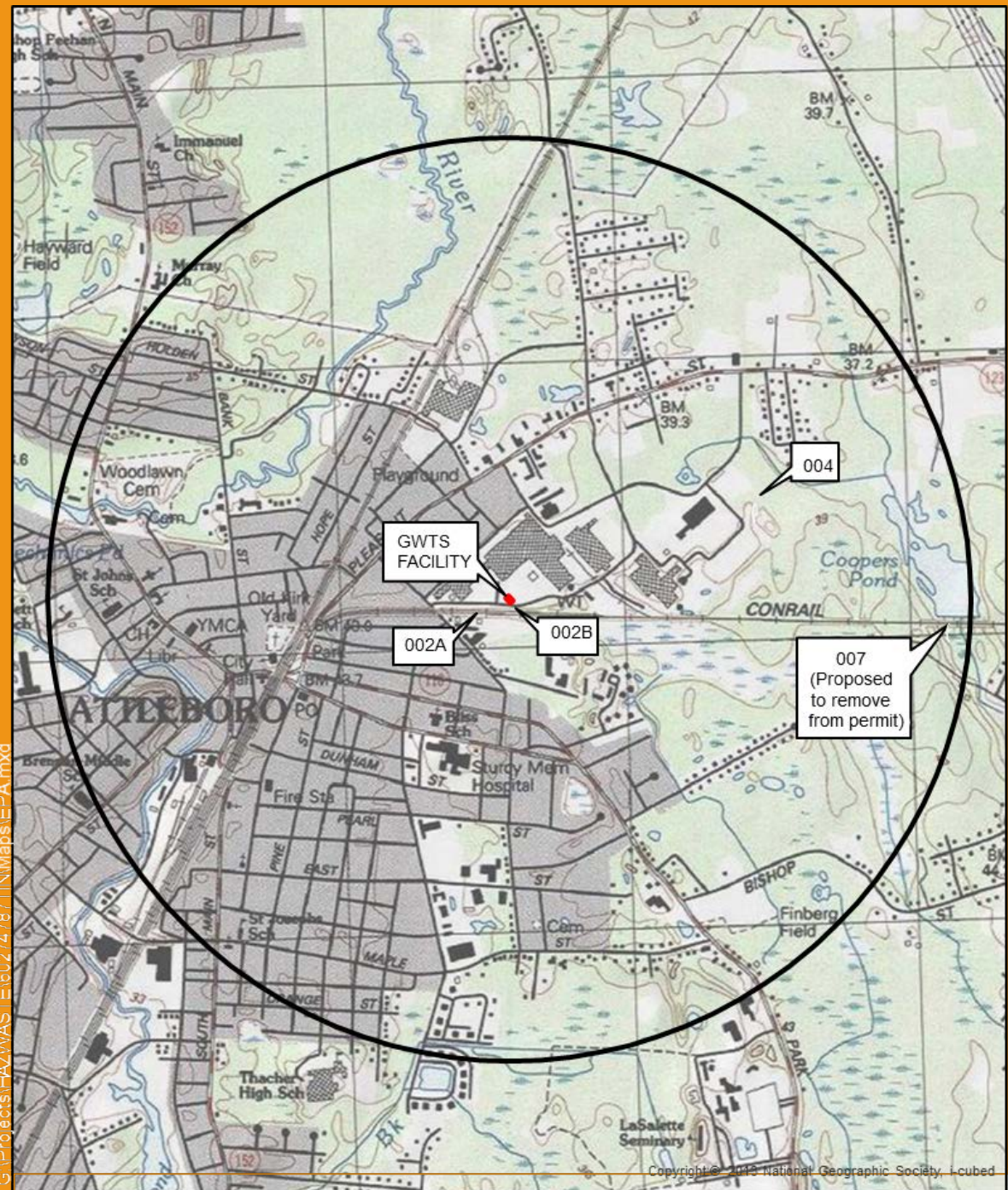
- 002A – GWTP discharge (treated GW from RTN 4-0022 remediation system for TCE plume) plus subsurface storm drain dry weather flow (GW infiltration) leaving site just north of RR tracks and entering city of Attleboro storm sewer system
 - Prior to Nov 2013 – dry weather flow not collected/treated
 - Nov 2013-present – dry weather flow collected/treated along with extracted GW
- 002B – GWTP discharge (treated GW)
- 004 – storm drain flow (including GW infiltration) from eastern part of campus (area where TCE plume is attenuating naturally)
- 007 – outlet of Coopers Pond (TI historic discharge to pond ended in 2000; pond sediment is MCP RTN 4-21862, COCs are metals, temporary solution in place since 2012 that monitors pond)
- TI submitted a request to eliminate 007 from the permit as part of its permit application 2015.

Outfall and Facility Locations

Legend

-  GWTS Facility
-  1-mile Buffer

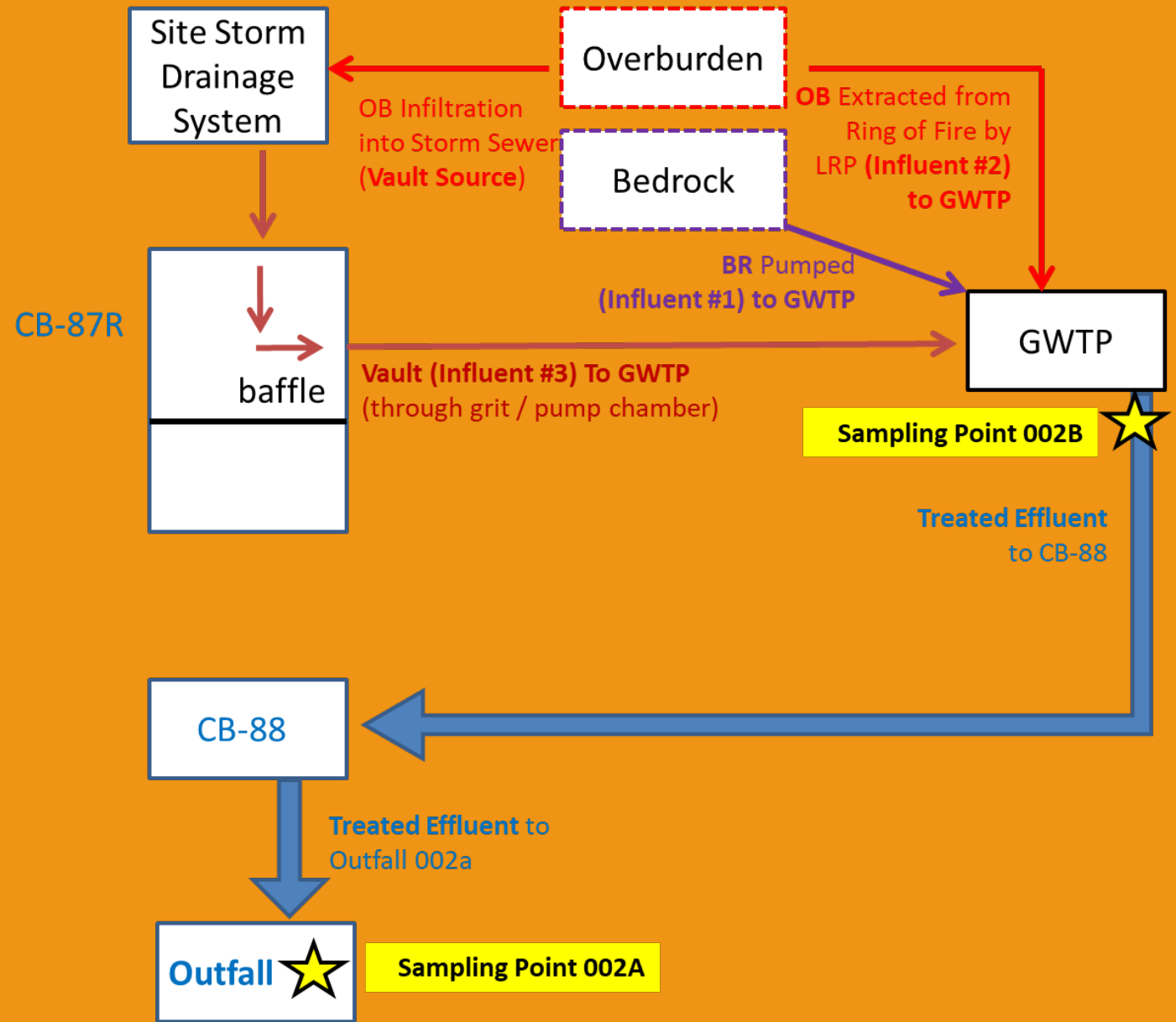
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Feet



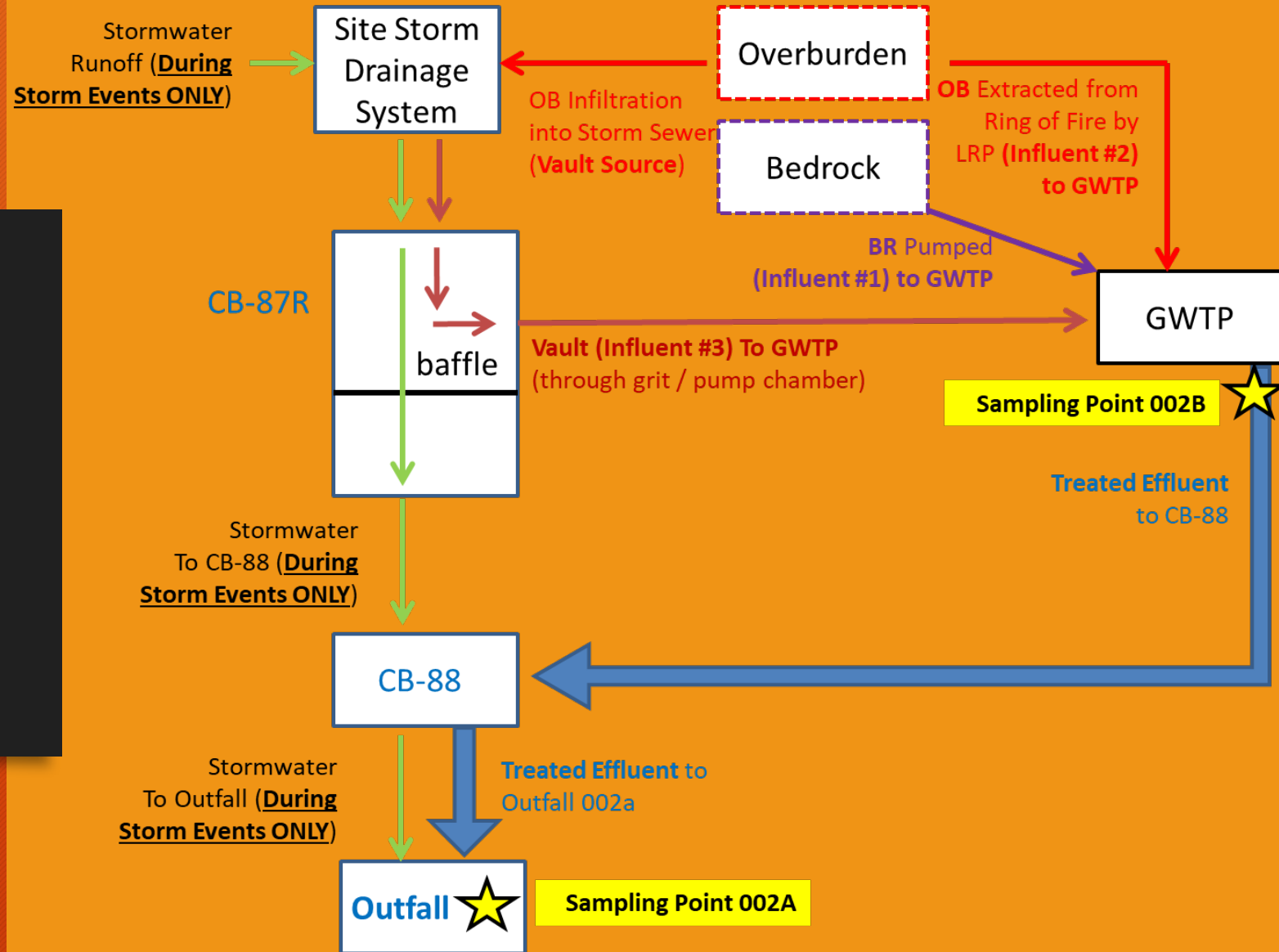
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Storm Drain and Groundwater Collection Systems



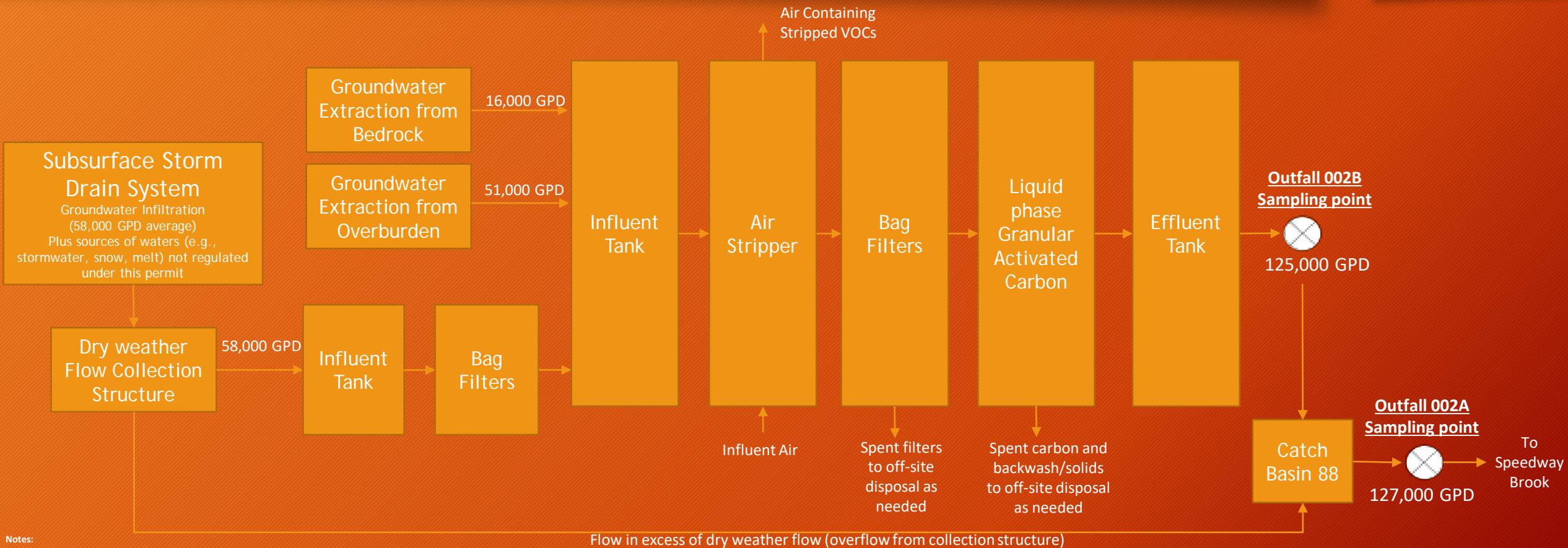
Stormwater Runoff (During Storm Events ONLY)



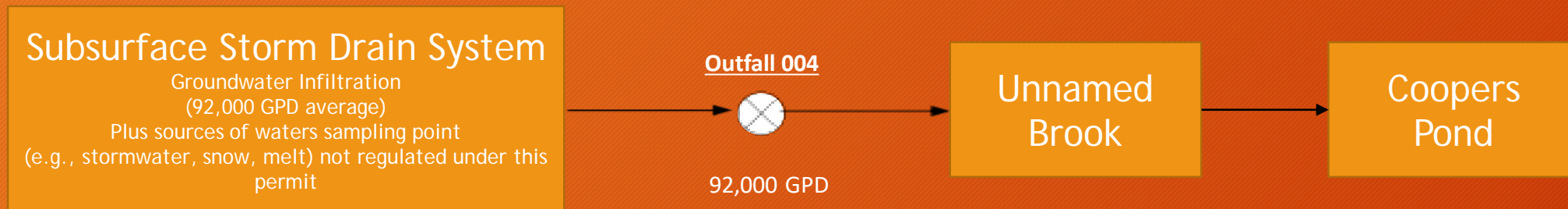
Overview of NPDES Permit and History (cont.)

Current Permit (October 2010)			
Outfall	Monitoring Frequency	Analytes	Limit/Requirement
002A (GWTP discharge plus dry weather flow)	Monthly	TCE	5
		Cis-1,2-DCE	70
		Vinyl Chloride, PCE	Report monthly
		pH	6.5 - 8.3
002B (GWTP discharge)	Monthly	TCE	5
		Trans-1,2-DCE	100
		pH	6.5 - 8.3
004 (dry weather flow, eastern area)	Monthly	TCE; cis-1,2-DCE	Report monthly
		PCE, Vinyl Chloride, Chloroform	Report quarterly
		pH	6.5 - 8.3
007 (Coopers Pond outlet)	Quarterly	pH, Al, Cu, Pb, Ni, Ag, Zn	Report Quarterly

Schematic of Water Flow: Outfalls 002A and 002B



Schematic of Water Flow: Outfall 004



Outfall 004 flow rate is based on average of monthly measurements from December 2018 – May 2020. These measurements are performed once a month during dry weather as specified in the permit.

Overview of NPDES Permit and History (continued)

- October 2010 Permit: limits set for TCE, other cVOCs in 002A (had been “report monthly”)
 - 2011 – storm drains cleaned and video inspected to determine if GW infiltration could be sufficiently prevented to meet 002A limits in short term; conclusion was no. Data collection to support new system design to collect and treat dry weather flow begins.
 - February 2012 – EPA issues Administrative Order with conditions/schedule for complying with new limits (construction of new dry weather flow collection system/GWTP)
 - May 2012 – system design submitted to EPA
 - October 2012 – TI obtains agreement with property owner to construct new system
 - April – October 2013: new GWTP with dry weather flow collection under construction
 - November 2013 – new system becomes operational
 - June 2015 – permit application submitted (includes request to eliminate 007)

Overview of NPDES Permit and History (continued)

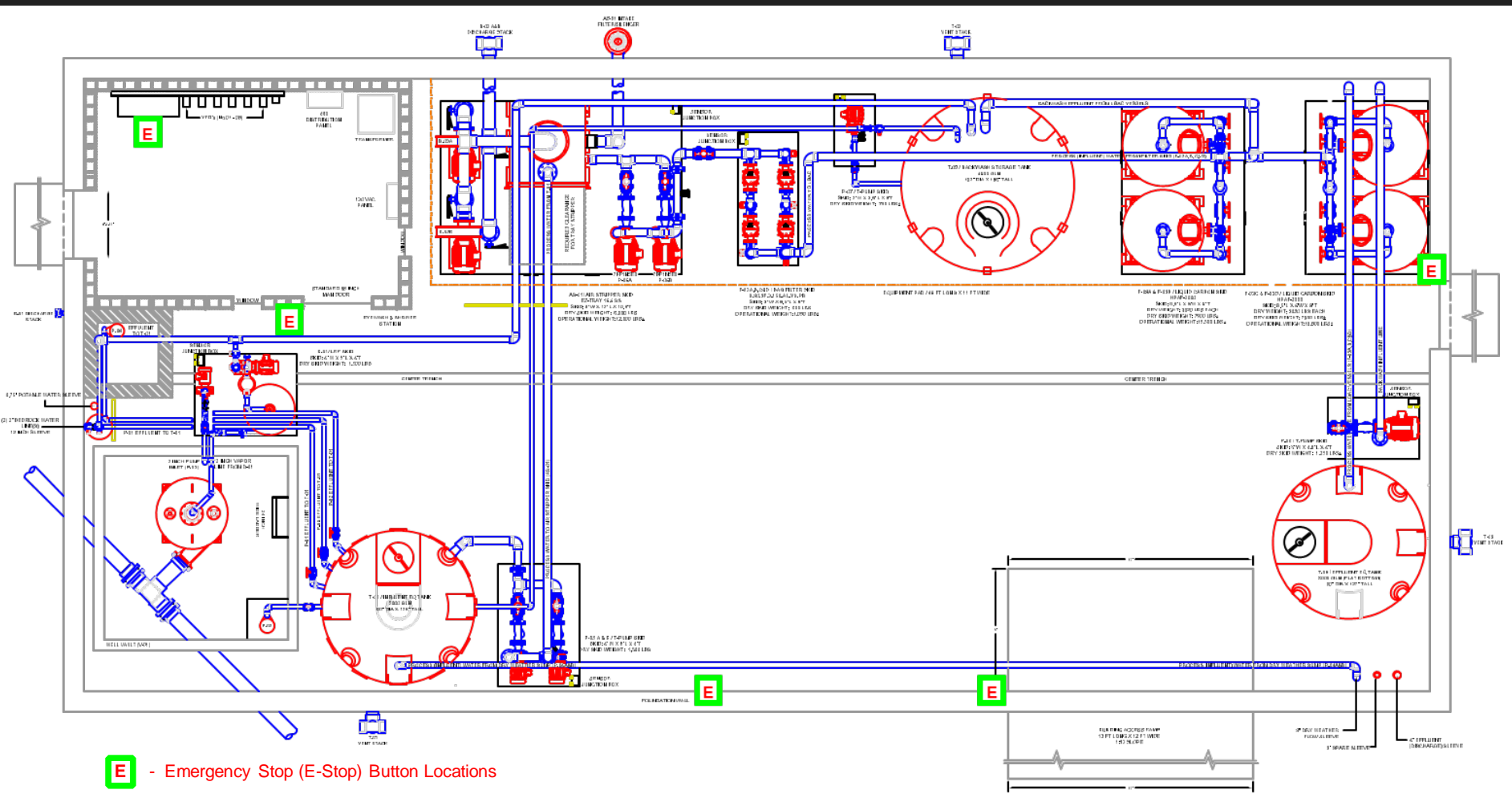
- The monthly monitoring requirements and permit limits from the March 2000 and October 2010 permits for 002B and 002A are summarized below. TCE drops to 5 ppb. New GWTP (tray air stripper, GAC polishing) designed for this value.

Outfall	Compound	Former Requirement or Limit (March 2000) (ppb)	New Limit (October 2010) (ppb)
002B (treatment system effluent)	trans-1,2-Dichloroethene	100	100
	TCE	100	5
	Chloroform	100	None
	pH	6.5-8.3	6.5-8.3
002A (dry weather flow from subsurface storm drain system)	cis-1,2-Dichloroethene	Report monthly	70
	TCE	Report monthly	5
	Vinyl Chloride	Report monthly	Report monthly
	Tetrachloroethylene	Report monthly	Report monthly
	Chloroform	Report monthly	None
	Methyl-tert-butyl ether	Report monthly	None
	pH	6.5-8.3	6.5-8.3

Overview of NPDES Permit and History (continued)

- The dry-weather flow collection system and new GWTP were designed to meet the October 2010 permit limits. Construction of the new system began in June 2013 and was completed in October 2013. The new system underwent testing and commissioning activities beginning in October before it was put into full operation in mid-November 2013.
- The average influent flow rates to the system since startup:
 - Overburden - 30 gpm
 - Bedrock - 15 gpm
 - Dry Weather Flow Collection Vault - 34 gpm

Note: This is the original layout from 2013 and does not include modifications made since then



Pictures of Current Treatment System

GWTP Building



Pictures of Current Treatment System

Aerial view – Influent tank, Control Room and Air Stripper visible



Control Room



Pictures of Current Treatment System

Bag Filter skid



Carbon Vessels



Pictures of Current Treatment System

Air Stripper skid



Backwash Tank



Pictures of Current Treatment System

Stormwater Pre-Filtration System



3.) Summary of Exceedance of TCE Permit Limit at Outfall 002A

- 79 sampling events and 31 exceedances between November 2013 and April 2020. May 2020 results were non-detect.
- Exceedances ranged from 5.4 ug/l to 60.8 ug/l (12 exceedances 10 ug/l or less). Exceedances have decreased in magnitude and frequency over time.
- Common reasons for exceedances:
 - Bacterial fouling of various system components;
 - Clog in storm drain system downstream of outfall 002A causing backup into collection system; and,
 - Insufficient capture of dry weather flow.

Summary of Exceedance of TCE Permit Limit at Outfall 002A (continued)

- Corrective Actions Implemented since 2014:
 - Downstream drain cleaning to remove clog (2014);
 - Stormwater influent line cleaning with acid wash (2014, 2015);
 - Float switch and pump repairs/replacements (2016 - 2020);
 - Catch basin bottom sealings (2017);
 - Addition of pre-filtration of dry-weather flow (2018);
 - Replacement of CB-88 (2019);
 - Adjustment of overburden and storm sewer systems recovery flow rates (2017 - 2020);
 - Adjustments of level setpoints to ensure complete capture of dry-weather flow (2018 - 2020); and,
 - Cleaned effluent discharge pipe (2018 - 2020).

Catch Basin Sealing (DMH-D in Building 3)

Pre-Sealing



1 day Post-Sealing



3 days Post-Sealing

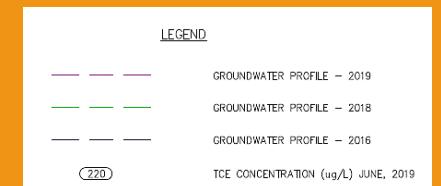
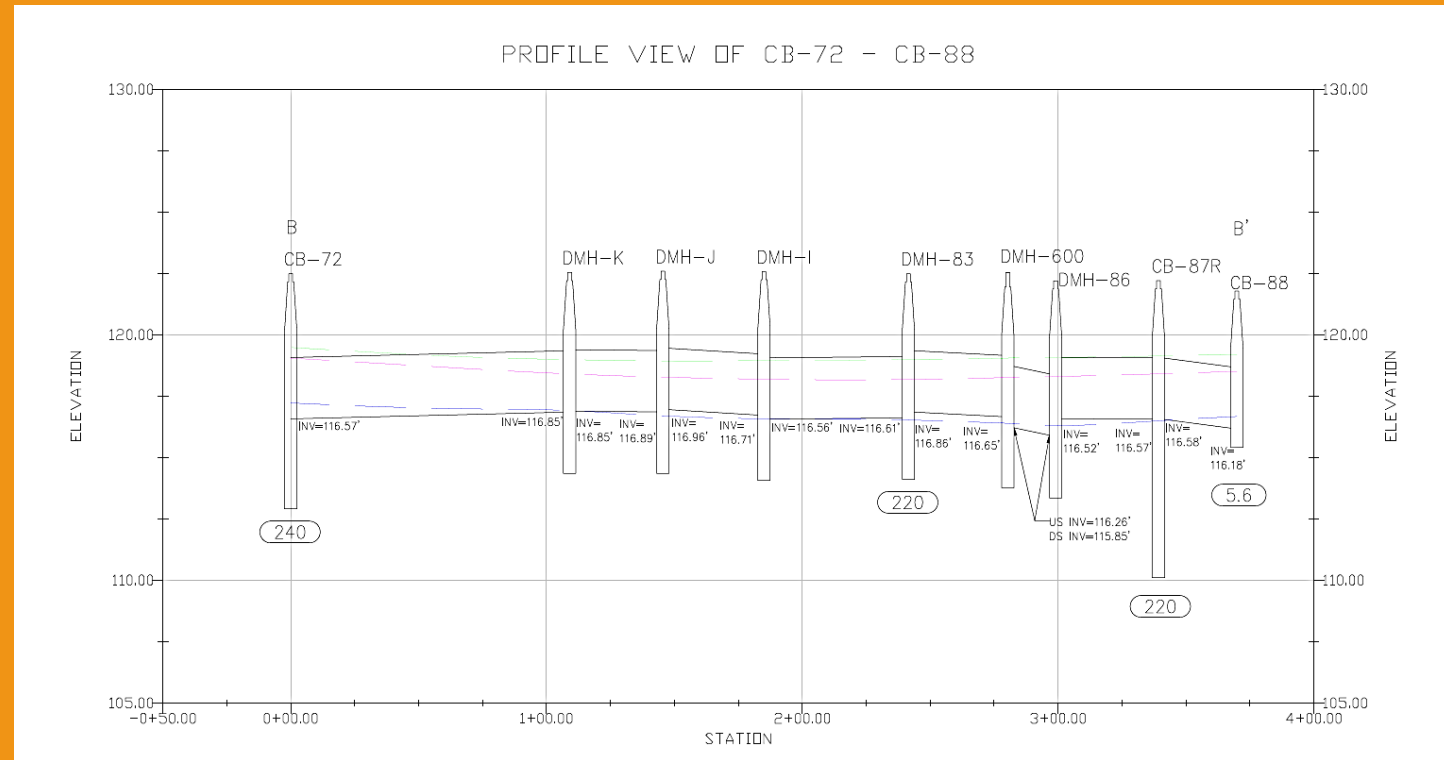


4.) On-going and Planned Storm Sewer and Recovery System Evaluation and Maintenance (2020)

- Storm sewer line (DMH-F) cleanout - June 2020.
- Catch basin sealing effectiveness testing - June/July 2020.
- Flow measurement work - on-going (continuation from 2019 studies):
 - Investigating groundwater infiltration to the subsurface storm water drainage system in the vicinity of the recovery and treatment system, to identify potential sources of significant infiltration, and to develop a strategy for improving the combined storm and groundwater recovery and treatment system efficiency.
- Overburden recovery system header pipe cleanouts - June/July 2020.

Example Storm Sewer Profile from 2019 Study

(depicting elevations, water levels
and TCE results)



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